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福島第1原発事故の半年 京都大原子炉実験所・小出裕章助教に聞く

原発に批判的な立場から事故を見続けてきた京都大原子炉実験所の小出裕章助教(62)に、今後予想される展開や課題を聞いた。

遮水壁、一刻も早く

事故は現在進行中だ。(略)

今なお放射性物質の封じ込めは実現せず、どちらに転ぶか分からない不安定な状況が続いている。

原子炉の中の正確な情報すらない中で、いろんな可能性を考えなければならない。

私は今後さらに大量の放射性物質が環境に拡散される可能性もあると考えている。

1号機では、溶けた燃料が圧力容器の底を破り、格納容器、さらに原子炉建屋の床を突き破って地面に潜り込んでいる可能性がある。そこから海洋や地下水に放射性物質が拡散しているかもしれない。

初期の注水などによって生じた放射性汚染水は11万立方メートルにも達する。

それらの一部は、地震でそこらじゅうにできたコンクリートの亀裂から建屋外へ漏れ出しているだろう。

取水口付近の亀裂から汚染水が流れ出ているのが見つかったが、氷山の一角に過ぎない。見えない地下では、今なお汚染水が漏れ出していると考え。福島第1原発を外部と遮断し、放射性物質を閉じ込める「地下ダム(遮水壁)」の建設を一刻も早く進めるべきだ。放射性物質をこれ以上出さないこと、これが本質だ。

国や東電は循環注水冷却システムを何とか稼働させ、あたかも成功したかのように喧伝しているが、放出は止まらず、稼働すればするほど放射性廃棄物が増える。本質からずれている。

燃料が圧力容器内にとどまっていなるとみられる1号機については、原子炉に注水する意味があるか疑わしい。多少残っている2、3号機は冷やし続ける必要があるが、システムは不安定だ。

再び燃料が過熱して溶け、水と接触して水蒸気爆発が起きれば、さらに大量の放射性物質が拡散するだろう。

東電は来年1月までに1~3号機を「冷温停止」状態にすることを目指している。

しかし、「冷温停止」とは、圧力容器の中の健全な核燃料を100度未満にするという専門用語だ。メルトダウンを認めていない4月の段階ならまだしも、燃料の健全性という前提が崩れた今「冷温停止を目指す」ことにどういう意味があるのか。

今後、がれきや汚染水処理後の汚泥など、大量の放射性廃棄物の保管が課題になる。(略)

溶け落ちた核燃料の回収も重い課題だ。

どうすれば回収できるのか、私には想像すらできない。

スリーマイル島原発事故(79年)では溶けた核燃料が圧力容器内にとどまっていたため何とか回収できた。

しかし、福島の場合は核燃料が地面にまで潜り込んでいる可能性があり、10年、20年単位の時間が必要だろう。

私たちは人類史上、遭遇したことがない事態を迎えている。

遮水壁

1Fから出た放射性物質が地下水を汚染し、敷地外に漏出することを防ぐため、地中に埋め込む鋼鉄製の壁。東電が8月に公表した計画では、長さ約22mの矢板を、1~4号機の原子炉建屋とタービン建屋を囲むように約600~700本、地面に垂直に打ち込む。年内に着工し、約2年で完成させる予定。耐用年数は30年。費用は公表されていないが、1000億円以上との試算もある。

[英訳全文]

## Radiation expert says outcome of nuke crisis hard to predict, warns of further dangers

As a radiation metrology and nuclear safety expert at Kyoto University's Research Reactor Institute, Hiroaki Koide has been critical of how the government and Tokyo Electric Power Co. (TEPCO) have handled the nuclear disaster at the Fukushima No. 1 nuclear plant. Below, he shares what he thinks may happen in the coming weeks, months and years.

The nuclear disaster is ongoing. Immediately after the crisis first began to unfold, I thought that we'd see a definitive outcome within a week. However, with radioactive materials yet to be contained, we've remained in the unsettling state of not knowing how things are going to turn out.

Without accurate information about what's happening inside the reactors, there's a need to consider various scenarios. At present, I believe that there is a possibility that massive amounts of radioactive materials will be released into the environment again.

At the No. 1 reactor, there's a chance that melted fuel has burned through the bottom of the pressure vessel, the containment vessel and the floor of the reactor building, and has sunk into the ground. From there, radioactive materials may be seeping into the ocean and groundwater.

The use of water to cool down the reactors immediately after the crisis first began resulted in 110,000 cubic meters of radiation-tainted water. Some of that water is probably leaking through the cracks in the concrete reactor buildings produced by the March 11 quake. Contaminated water was found flowing through cracks near an intake canal, but I think that's just the tip of the iceberg. I believe that contaminated water is still leaking underground, where we can't see it. Because of this, I believe immediate action must be taken to build underground water barriers that would close off the nuclear power plant to the outside world and prevent radioactive materials from spreading. The important thing is to stop any further diffusion of radioactive materials.

The government and plant operator TEPCO are trumpeting the operation of the circulation cooling system, as if it marks a successful resolution to the disaster. However, radiation continues to leak from the reactors. The longer the circulation cooling system keeps running, the more radioactive waste it will accumulate. It isn't really leading us in the direction we need to go.

It's doubtful that there's even a need to keep pouring water into the No.1 reactor, where nuclear fuel is suspected to have burned through the pressure vessel. Meanwhile, it is necessary to keep cooling the No. 2 and 3 reactors, which are believed to still contain some fuel, but the cooling system itself is unstable. If the fuel were to become overheated again and melt, coming into contact with water and trigger a steam explosion, more radioactive materials will be released.

TEPCO says it is aiming to bring the No. 1, 2 and 3 reactors to cold shutdown by January 2012. Cold shutdown, however, entails bringing the temperature of sound nuclear fuel in pressure vessels below 100 degrees Celsius. It would be one thing to aim for this in April, when the government had yet to confirm that a meltdown had indeed taken place. But what is the point of "aiming for cold shutdown" now, when we know that fuel is no longer sound?

In the days ahead, the storage of enormous quantities of radiation-contaminated waste, including tainted mud resulting from the decontamination process, will become a major problem. Because the responsibility for spreading nuclear materials into the environment lies with TEPCO, it makes sense to bring all the radioactive waste to TEPCO headquarters in Tokyo.

Since that's not possible, the waste should be taken to the grounds of the nuclear power plant. If the plant is not large enough to accommodate all the waste, then a location close to the plant will also have to be designated as a nuclear graveyard. However, no one should take advantage of the chaos and force Fukushima to host interim radioactive waste repositories for spent fuel from other nuclear power plants.

Recovering the melted nuclear fuel is another huge challenge. I can't even imagine how that could be done. When the Three Mile Island accident took place in 1972, the melted nuclear fuel had stayed within the pressure vessel, making defueling possible. With Fukushima, however, there is a possibility that nuclear fuel has fallen into the ground, in which case it will take 10 or 20 years to recover it. We are now head to head with a situation that mankind has never faced before.

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